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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,682	10/18/2003	Le Li	KOI-03-01	9346
24295	7590	09/11/2006	EXAMINER	
Rodney T. Hodgson, Ph.D. 822 Pines Bridge Rd. Ossining, NY 10562			RAHLL, JERRY T	
			ART UNIT	PAPER NUMBER
			2874	

DATE MAILED: 09/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/687,682

Applicant(s)

LI ET AL.

Examiner

Jerry T. Rahll

Art Unit

2874

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 June 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,4-14 and 17-39 is/are rejected.
- 7) ☒ Claim(s) 2,3,15 and 16 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 4-10, 13-14, 17-24, 29, 32-33, 35-37 and 39 are rejected under 35

U.S.C. 102(e) as being anticipated by US Patent No. 6,559,921 to Leslie et al.

3. Regarding Claim 1, Leslie et al. describes an apparatus having a waveguide switching element with a wave guide substrate (110), a planar waveguide (130, 140, 150) attached to the substrate, and a liquid crystal material (160) in operative contact with the waveguide and attached to the waveguide substrate, where the liquid crystal material has a first state where its index of refraction matches the index of refraction of the waveguide and has a second state where its index of refraction does not match the index of refraction of the waveguide (Columns 4-5). Leslie et al. further describes a means (120, 170) for applying an electric field across the liquid crystal material where the liquid crystal material switches between the first and second states as the electric field is applied. Leslie et al. further describes a beam of light propagating in the waveguide is not reflected when the liquid crystal material is in the first state, but is reflected via total internal reflection when the liquid crystal material is in the second state (see further Figures 2-8 and Columns 3-5).

4. Regarding Claim 4, Leslie et al. describes the first and second states of the liquid crystal as nematic states (see Figures 3A-3B).
5. Regarding Claims 5 and 6, Leslie et al. describes the liquid crystal material in a trench (135) that intersects the waveguide.
6. Regarding Claim 7, Leslie et al. describes the trench as intersecting the waveguide at an angle greater than the angle for total internal reflection when the liquid crystal material is in the second state (Column 3 Lines 10-15).
7. Regarding Claims 8-10, Leslie et al. describes the means for applying an electric field as a pair of Indium-Tin-Oxide electrodes (120, 170) in electric contact with the liquid crystal material.
8. Regarding Claims 13-14, Leslie et al. describes a cover substrate (180) having first and second surfaces.
9. Regarding Claims 17-19 Leslie et al. describes an alignment layer (155, 165) on the walls of the trench contacting the liquid crystal material for homogeneous or homeotropic alignment of the liquid crystal material (see Column 4).
10. Regarding Claims 20-21, Leslie et al. describes the beam as linearly or circularly polarized (see Columns 5-6).
11. Regarding Claim 22, even though Leslie does not specifically describe the light as randomly polarized, the switch device would inherently act as a switch for such light because of the change in the optical properties in the liquid crystal material when an electric field is applied.
12. Regarding Claim 23, Leslie et al. describes the reflected light reflected by total internal reflection when the LC material is in the second state (see Column 4).

Art Unit: 2874

13. The methods of Claims 24, 29, 32-37 and 39 are embodied by the above-described of Leslie et al.

*Claim Rejections - 35 USC § 103*

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claim 11-12, 25-28, 30-31 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leslie et al.

16. Regarding Claims 11-12, Leslie et al. do not specifically describe the electrodes as in-plane switching electrodes at the top of the liquid crystal material. However it is well-known that in-plane electrode configurations may be substituted for opposing electrode structures. Therefore, at the time of invention it would have been obvious to one of ordinary skill in the art to use a configuration of as in-plane switching electrodes at the top of the liquid crystal material. The motivation for doing so would have been to eliminate the manufacturing steps necessary to embed the bottom electrode. The method of Claims 30-31 and 38 are embodied by such a device configuration.

17. Regarding Claims 25-28, Leslie et al. does not specifically describe the planar waveguide as having a curvature path. However, planar waveguides formed with curved paths are well-known in the art. Therefore, at the time of invention it would have been obvious to one of ordinary skill in the art to create the waveguide with a curved path to allow for compact routing of optical signals between inputs, outputs and switching elements.

***Allowable Subject Matter***

18. Claims 2-3 and 15-16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

19. Claims 2-3 describe the first state of the LC material as an isotropic state and the second state as a nematic state. Claims 15-16 describe the first surface of the cover substrate contacting the waveguide surface.

***Response to Arguments***

20. Applicant's arguments filed June 21, 2006 have been fully considered but they are not persuasive.

21. Regarding Applicant's argument that the electrodes of Leslie et al. are not capable of in-plane switching, the Examiner notes that this deficiency of Leslie et al. is discussed in the previous Office Action and above in paragraph 16.

22. Regarding Applicant's argument that Leslie et al. fails to describe a beam of light in any polarization not reflected when the LC material is in the first state and reflected when the LC is in the second state, the Examiner notes that the light of the Leslie et al. description is of "any polarization". TM and TE polarizations are of "any polarization".

***Conclusion***

23. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO**

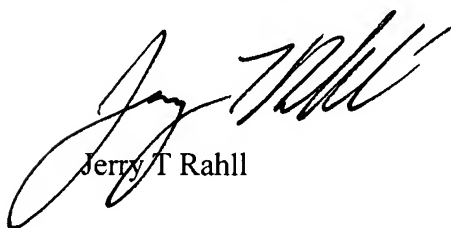
Art Unit: 2874

MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry T. Rahll whose telephone number is (571) 272-2356. The examiner can normally be reached on M-Th (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jerry T. Rahll



MICHELLE CONNELLY-CUSHMAN  
PRIMARY EXAMINER  
9/5/08